

SN 09/697,259

wherein at least a portion of the valve assembly is in the form of or incorporates a permanent magnet and a further magnet is located adjacent the valve seat, and said valve assembly is configured to transition between said second closed position and said first open position based on a pressure differential arising from said fluid between said inlet and said outlet.

REMARKS

Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants respectfully submit that, for reasons set forth below, the amended independent claim 1 is allowable under 35 U.S.C. 102 and 103. As such, claim 11, which depends indirectly from claim 1, is also allowable in its current dependent form.

A. 35 U.S.C. 102

Claims 1 and 4-9

Claims 1 and 4-9 have been rejected under 35 U.S.C. 102(b) as being anticipated by Gast et al. (US 4,392,632).

Applicants have amended claim 1 to further recite: "said valve assembly is configured to transition between said second closed position and said first open position based on a pressure differential arising from said fluid between said inlet and said outlet." Applicants submit that the amended claim 1 is not anticipated by Gast et al. because Gast et al. does not disclose each and every element of the amended claim.

Gast et al. teaches an electromagnetic valve, in which "[a] pulse current in one direction opens the valve and a pulse in the other direction closes it" (col. 2, lines 33-35). Thus, the valve in Gast et al. is designed specifically to open or close by passing a current through electromagnetic coils (e.g., see Abstract and col.2, lines 11-35) - i.e., the opening or closing of the valve is initiated solely by magnetic forces.

By contrast, Applicants' valve relies on the pressure differential across the inlet and outlet of the valve to initiate either opening or closing the valve. Although a magnetic force is used for biasing the valve assembly towards the closed position, the transition of the valve between its closed and open positions is based on the pressure differential across the inlet and outlet.

SN 09/697,259

Nowhere does Gast et al. teach the opening or closing of the valve by virtue of the pressure differential exerted by a fluid, as recited in Applicants' amended claim 1. Therefore, Applicants' amended claim 1 is not anticipated by Gast et al.

Claims 4-9 depend, either directly or indirectly from claim 1. For the same reason set forth above, these claims are also not anticipated by Gast et al., and therefore patentable under 35 U.S.C. 102(b).

Claims 1 and 3

Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Zippe (US 4,750,705). Applicants respectfully submit that neither the amended claim 1 nor claim 3 is anticipated by Zippe because Zippe does not disclose each and every element recited in these claims.

Zippe teaches a magnetic quick action valve having a permanent magnet assembly for urging the valve member onto the valve seat. As stated in Zippe's Abstract, the normally opened valve is specifically designed so that "after closing it may not reopen of its own accord whatever the later changes in direction of flow or whatever the variations in pressure." (See also col.1, lines 35-44.) Furthermore, Zippe teaches that the closing force is exerted by magnets, and that once the valve has shut, it can only be reopened by external mechanical or magnetic action - e.g., Abstract, col.1, lines 54-56 and claim 1.

That is, the valve in Zippe is designed as a normally opened valve that can be shut off to seal off a duct for a fluid; and it is specifically designed not to be reopened of its own accord, even if the fluid flow or pressure subsequently changes.

By contrast, Applicants' valve is designed so that the transition between the opened or closed positions of the valve (i.e., from opened to closed, and vice versa) is based on the pressure differential across the inlet and outlet. For example, as discussed on page 4, lines 8-19 of Applicants' specification, when the pressure differential increases to an extent that the resulting upward force is larger than the attractive force between magnets 14 and 16 and the weight of the valve assembly, valve opening is initiated. On the other hand, when the pressure differential drops sufficiently low so that the resulting upward force is lower than the attractive force between magnet 14 and top cap 9 and the weight of the valve assembly, valve closing is initiated (see, e.g., page 4, line 30 to page 5, line 14).

SN 09/697,259

Nowhere does Zippe disclose the transition between the opened or closed position of the valve as being dependent on the pressure differential of a fluid across the inlet and the outlet, as recited in Applicants' amended claim 1. Instead, Zippe teaches the closing of the valve through a magnetic force, and that the valve will not reopen of its own accord even if the fluid pressure subsequently changes. Thus, Zippe actually teaches away from Applicants' invention, which allows the valve to close upon the reduction of the pressure differential to a sufficiently low level.

Therefore, Applicants respectfully submit that the amended claim 1 is not anticipated by Zippe. Claim 3, which depends from the amended claim 1, is also not anticipated by Zippe. As such, claims 1 and 3 are both patentable under 35 U.S.C. 102(b).

B. 35 U.S.C. 103

Claim 3

Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gast et al. Applicants respectfully disagree.

As previously discussed, Gast et al. teaches a valve that is opened or closed by electromagnetic forces. Specifically, the valve is designed to be "actuated electromagnetically for opening and closing a fluid flow orifice, and particularly one which will not require a spring and one that can be opened and closed by pulses without requiring long continued flow of current to maintain the valve in either end position." (col.2 lines 18-23.) Gast et al. focuses on improving electromagnetic actuated valves - specifically, minimizing the need to maintain the current flow beyond the initial opening or closing of the valve by the current pulses. Nowhere does Gast et al. teach or suggest a different opening or closing mechanism such as one based on the pressure differential across the inlet and outlet, as recited in Applicants' amended claim 1.

As such, one skilled in the art would not have been motivated by Gast et al. to modify the electromagnetic valve design to initiate opening or closing based on the pressure differential. Applicants submit that the amended claim 1 is not obvious over the teaching of Gast et al.

For the same reason set forth above, claim 3, which depends from independent claim 1, is also not obvious over Gast et al.

SN 09/697,259

Claim 10

Finally, Examiner has rejected claim 10 as being unpatentable over Gast et al. as applied to claims 1 and 4-9 above, and further in view of Tischer et al. (US 5,323,809). Examiner states that Gast et al. discloses all the claimed features with the exception of a shock absorber, and cites Tischer et al. for disclosing the use of a shock absorber (50) to reduce the noise within the valve assembly resulting from the impact during seating of the valve.

As set forth above, Applicants' amended claim 1 is not anticipated, or rendered obvious, by Gast et al. Since claim 10 depends indirectly from amended claim 1, Applicants respectfully submit that claim 10 is also not obvious over Gast et al.

Furthermore, claim 10 is not obvious over Gast et al. in combination with Tischer et al. for the following reason. Tischer et al. teaches a hydraulic solenoid valve having an armature 25 that is displaced in two directions during normal operation using a magnet 48 and a return spring 9 (e.g., Abstract, col. 4, line 50-col. 5, line 3, and col. 5, line 64-col. 6, line 43). In Tischer et al., a safety device is used to prevent the valve ball from lifting off its seat during normal operation (valve ball is lifted off the seat only in emergency situations) thereby resulting in a more reliable switching operation (e.g., col. 5, lines 4-54). Nowhere does Tischer et al. teach or suggest the use of a pressure differential to initiate the opening or closing of the valve, as recited in Applicants' amended claim 1.

Therefore, even if Gast et al. were to be combined with Tischer et al., one would not have arrived at Applicants' invention as recited in amended claim 1. As such, the amended claim 1 is not obvious over Gast et al. or Tischer et al., either alone or in combination with each other.

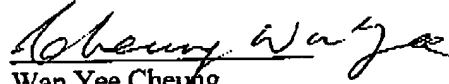
Claim 10, which depends indirectly from the amended claim 1, is therefore not obvious over Gast et al. in view of Tischer et al., and thus, patentable under 35 U.S.C. 103(a).

In view of the amendment and the remarks set forth above, Applicants request reconsideration of the rejection and allowance of all presently pending claims. Since the claims are in condition for allowance, prompt and favorable action is hereby respectfully solicited. Should there be any remaining issues, please feel free to call the Applicant's attorney in order to expedite the resolution of these issues.

SN 09/697,259

Attached hereto is a marked-up version of the changes made to the claim by the current amendment. The attached page is captioned "Version with markings to show changes made".

Respectfully submitted,



Wan Yee Cheung

Registration No. 42,410

Attorney for Applicant(s)

Date: 1/31/03

The BOC Group, Inc.
100 Mountain Avenue
Murray Hill, NJ 07974
Phone: 908-771-6479
FAX: 908-771-6159

Encl.:

Transmittal Form with Certificate of Facsimile Transmission

SN 09/697,259

Version with markings to show changes made**In the claims**

Claim 1 has been amended as follows:

1. (Amended) A valve comprising a housing having an inlet and spaced therefrom an outlet, a passageway extending between the inlet and the outlet, and means located in the passageway for controlling the flow of a fluid between the inlet and the outlet, the means including a valve assembly movable between a first open position spaced from a co-operating valve seat and a second closed position at which the valve assembly sealingly engages the valve seat, in which magnetic means is provided for biasing the valve assembly towards the second closed position; wherein at least a portion of the valve assembly is in the form of or incorporates a permanent magnet and a further magnet is located adjacent the valve seat, and said valve assembly is configured to transition between said second closed position and said first open position based on a pressure differential arising from said fluid between said inlet and said outlet.